

Title: Zonker Mania**Brief Overview:**

Students will be presented with a real-life situation. They will collect, organize, interpret, analyze, and display data. The students will demonstrate the basic concepts of probability.

Links to NCTM Standards:

- **Mathematics as Problem Solving**

After receiving the contest rules, students will cooperatively demonstrate their ability to solve problems with open-ended answers.

- **Mathematics as Communication**

Students will demonstrate their ability to communicate mathematically. They will discuss predictions and outcomes cooperatively, write to persuade, and display the gathered data in an appropriate manner.

- **Mathematics as Reasoning**

Students will demonstrate their ability to reason mathematically by supporting their predictions with gathered data.

- **Mathematical Connections**

Students will demonstrate their ability to make connections between mathematics, science, and language arts.

- **Number Sense and Numeration**

Students will demonstrate their ability to describe and apply number relationships using collected data.

- **Concepts of Whole Number Operations**

Students will choose appropriate operations and describe effects of operations on the collected data.

- **Statistics and Probability**

Students will demonstrate their ability to collect, organize, and display data and will interpret information obtained from their contest investigations. They will write a conclusion based on their statistical information. Students will demonstrate their ability to apply the basic concepts of probability by predicting and finding the actual probability of winning the contest.

Grade/Level:

Grades 4 - 5

Duration:

This unit will take approximately 3 class periods (60 minutes each).

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Basic computation skills
- Predicting
- Graphing (line plot, bar graph)
- Comparing / contrasting data
- Number sense
- Probability
- Mean, median, mode, and range

Objectives:

Students will:

- collect, organize, interpret, analyze, and display data.
- work cooperatively in groups.
- identify solutions to real life situations.
- write to persuade.
- compare/contrast data.

Materials/Resources/Printed Materials:

- One die per student
- Student Resource Sheets (SRS)
- Teacher Resource Sheets (TRS #1A & 3A need to be transparencies.)
- Graph paper for line plotting (one per group)
- Calculators
- Rulers
- Overhead projector
- Candy bars (double wrapped bars work best--e.g. Kit Kat) (may use candy bar template- TRS #2B to make “imaginary” candy bars)
- Crayons or colored pencils

Development/Procedures:**Day 1:**

- Review vocabulary terms from Teacher Resource Sheet #1A while reading and discussing contest rules. Compare this contest with other known contests and discuss how probability is used.
- Distribute Student Resource Sheets #1A - 1C. Review directions and allow students to cooperatively complete. **Have students save all gathered data and group line plots for the following lessons.

Day 2:

- Use student generated data from yesterday's investigation to construct a class line plot (e.g. use chalkboard, overhead projector, number line, chart paper, etc.). Using this data, lead a class discussion to determine the number of Zonker bars they'd expect to have to buy to win. Students need to use this number when completing SRS #2A.

- Distribute SRS #2A-2B. Have students cooperatively and individually complete as directed. Letters of persuasion (SRS #2B) need to be collected at the end of today's lesson.
- Use class' prediction from SRS #2A to determine number of candy bars needed for tomorrow's lesson. Using TRS #2A, cut and place game cards in candy bar wrappers. Be sure to include multiples of six of the game cards, so the chance of drawing each letter is equal. Our simulation was based on the premise that the contest outcomes would be equally likely to occur.

Day 3:

- Distribute candy bars. Have students unwrap and reveal their game cards. Record all game card results on TRS #3A (transparency).
- Have cooperative groups transfer this class generated data from transparency to SRS #3A. Students will create bar graphs displaying the actual contest outcomes. Students need to use this information complete SRS #3B.
- Explain all outcomes in a contest aren't equally likely to occur. You may want to discuss real-life contests that occur. (e.g., McDonald's, Pepsi, Mountain Dew, etc.) However, the Zonker Mania contest was designed for people to have an equally likely chance of winning.

Performance Assessment:

Zonker Mania is a three day unit divided into four tasks that provide scoring tools. Assessment can be done through oral presentations, teacher observation, and written work.

Extension/Follow Up:

- Writing to persuade: *"This contest is costing the Zonker Candy Company too much money. How could the company change the contest? Write a letter to the company giving your suggestions based on the previous activities."* Students could also design a new contest and present it to the class.
- Have students investigate other contests and the likelihood of winning. Compare the method we used to "win" with the odds of winning these other contests.
- Have students use a road map to map the best route to Hershey Park, PA.
- Teacher could extend this lesson by taking the class to Hershey Park! (You may use the following suggestions to make your simulated trip more authentic.) Teacher could create sample receipts from their visit to Hershey Park and have students classify them into various categories (e.g., snack foods, games, souvenirs). The students could graph and analyze these results.

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Teacher Resource Sheet #1A

(Make into transparency)

Probability Vocabulary

certain - an event that will definitely happen and has a probability of one

chance - the likelihood of an event occurring
e.g., "*What are the chances?*" 1 out of 4 = $1/4 = .25 = 25\%$.

highly unlikely - an event that could happen but most often will not

impossible - an event that will definitely not happen and has a probability of zero

likely - an event that may possibly happen

outcomes - any possible result of an event

unlikely - an event that is not expected to happen, but could possibly happen

equally likely - two events that have the same chance of occurring

Student Resource Sheet #1A

Zonker Mania Contest

A new candy bar, Zonker, designed to delight kids, has opened a contest to all Zonker consumers! In order to win the trip to Hershey Park, contestants need to collect game cards and spell:

Z - O - N - K - E - R.

Imagine, our class has the opportunity to participate in this contest, IF we can convince our PTA to purchase the candy bars. What mathematical skills and thinking can you use to help us collect the winning game cards?

If we want to collect all of the letters, how many candy bars must PTA buy?

What is your prediction? _____

What is the fewest number of candy bars PTA would need to buy, if we were extremely lucky? _____

- Use the numbers on a die to represent the six different letters.
- Toss the die and record the outcomes in the frequency table below.
- Continue to toss the die until you have one of each letter.
- Repeat this process three more times to complete this frequency chart.

Student Resource Sheet #1B

Zonker Mania Frequency Chart

Game Card	Trial 1	Trial 2	Trial 3	Trial 4
1 - Z				
2 - O				
3 - N				
4 - K				
5 - E				
6 - R				
TOTALS				

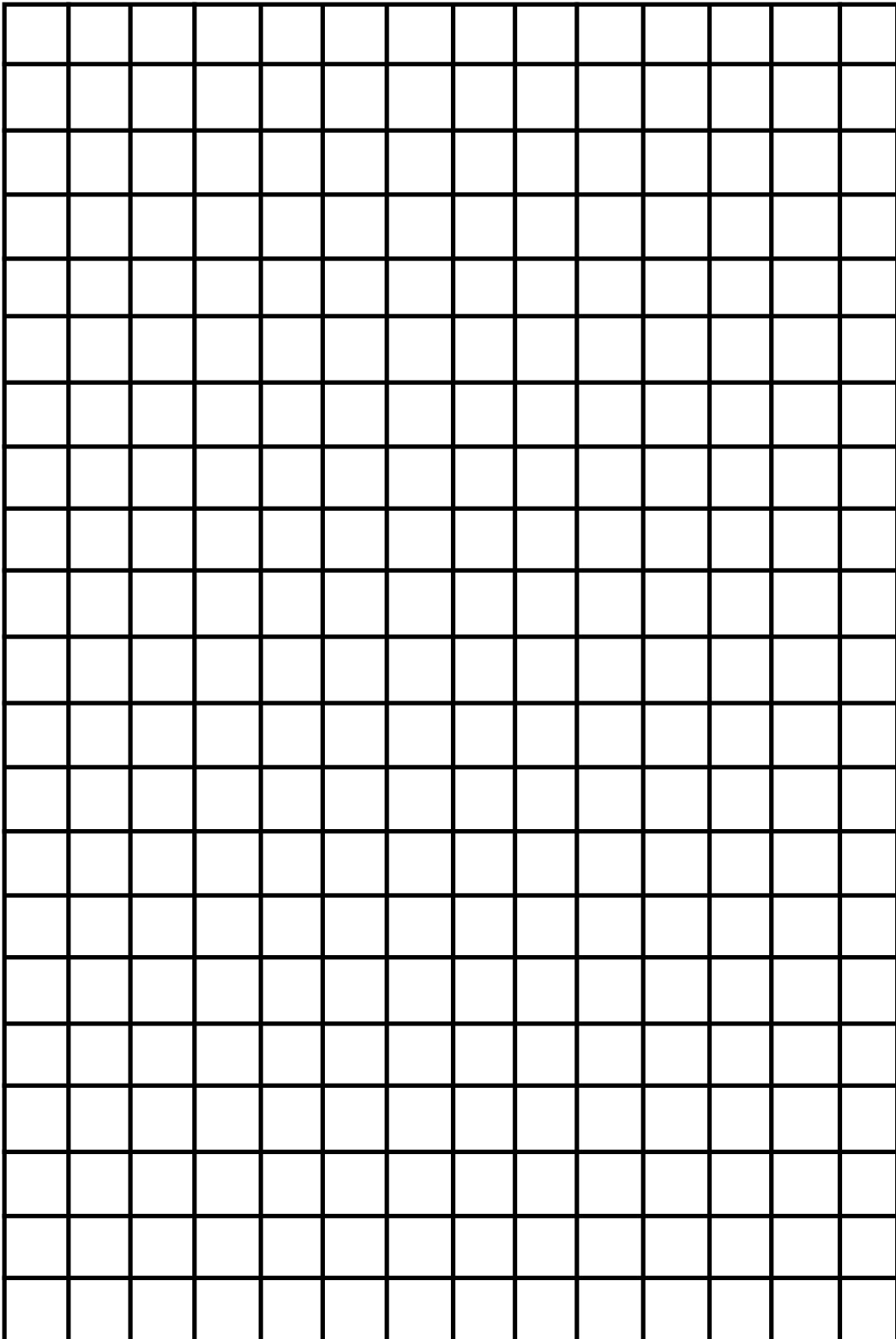
Compare your prediction with the results of your tosses.

Group's Range = _____

- Use all group members' data totals to construct one line plot on the graph paper provided.
- Use your group's line plot to record the following information.
 - mean = _____
 - median = _____
 - range = _____
 - mode = _____

Student Resource Sheet #1C

Use this graph paper to construct a line plot showing your group's data totals.



Student Resource Sheet #2A

Zonker Mania Continues...

Line plot conclusion:

- Number of candy bars we'd expect to buy to win _____
- Do you agree or disagree with the class' line plot conclusion? _____

Justify your decision.

In your group, use the class' line plot conclusion to determine what it would cost to win the contest if the candy bars cost \$0.60 each. You may use the resources available, including a calculator, if needed. Please show your work in the space below.

Student Resource Sheet #2B

Our PTA president has extra funds and is willing to use them for appropriate student activities. We need to convince the PTA board that the Zonker Mania contest is worth sponsoring. When you write your persuasive letter to request the money for the candy bars, be sure to provide evidence that this activity is educational.

Before you begin writing your persuasive letter, think about the following ideas:

- frequency chart
- line plot
- cost

Now write a letter to persuade the PTA president to buy Zonker bars, so we can win the trip to Hershey Park, PA.

Teacher Resource Sheet #2A

* Note: You may need to photocopy this page in order to provide enough game cards, based on the class' prediction. When stuffing the candy bar wrappers, be sure to always have multiples of six of the game cards and candy bars. (Ex. If students decide that eight candy bars will win the contest, then buy and stuff twelve candy bars.) This will make the chance of drawing each letter equal. (Remember: in example given, they would still only pick eight candy bars.)

Z

O

N

K

E

R

Z

O

N

K

E

R

Teacher Resource Sheet #2B

ZONKER

ZONKER

ZONKER

ZONKER

ZONKER

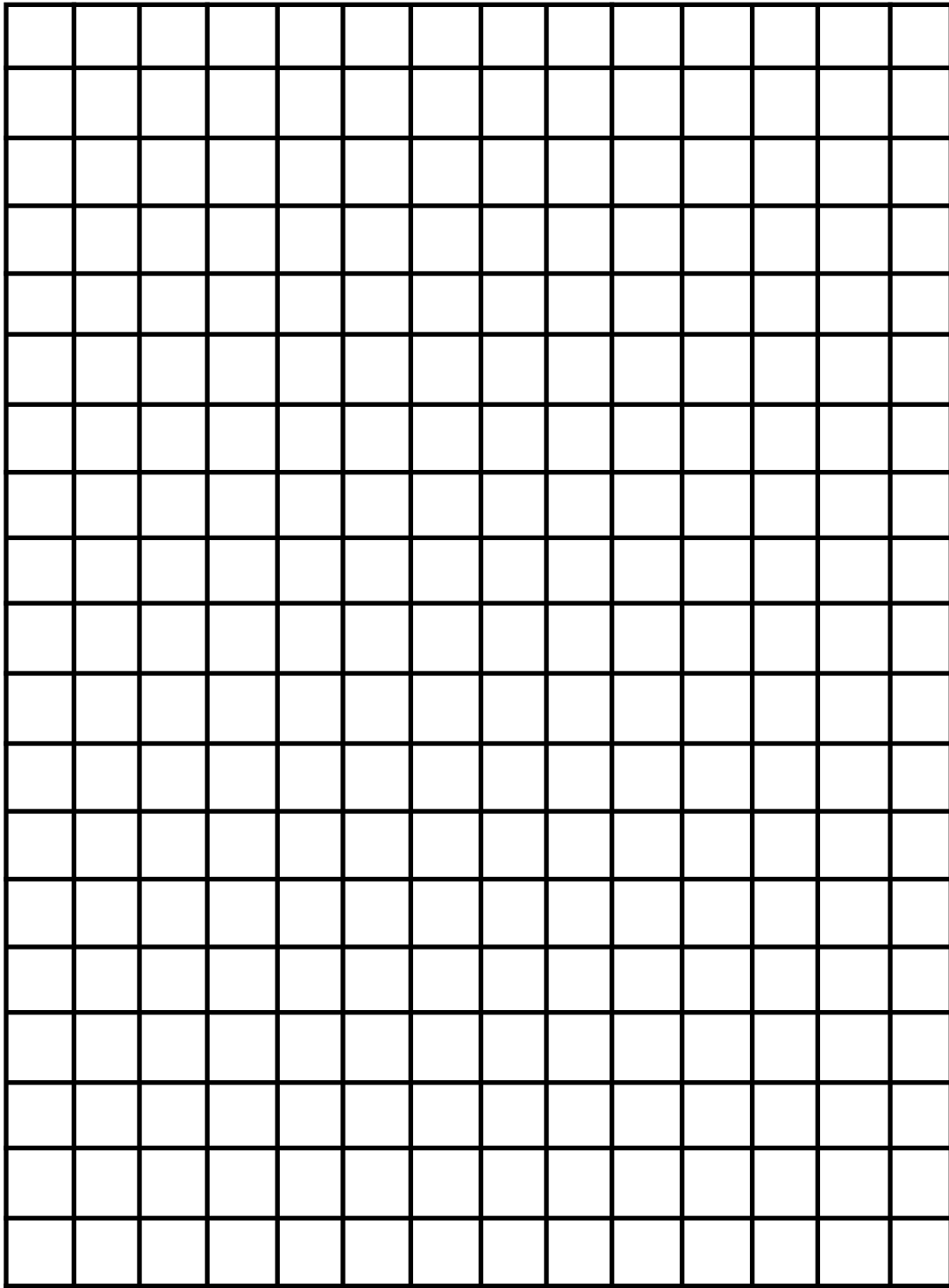
ZONKER

Teacher Resource Sheet #3A
(Make into transparency)

Z
O
N
K
E
R

Student Resource Sheet #3A

Use this graph paper to construct a bar graph showing the actual Zonker bar results. (See chart on transparency.)



Student Resource Sheet #3B

Zonker Mania Results

Use your bar graph to relate your original prediction to the actual outcomes! Please include the math vocabulary that we have discussed during this contest.

Teacher Resource Sheet #4A

(The following tools were designed for teachers to use at their own discretion.)

Scoring Tools

Letter - Writing to Persuade

2 Consistently addresses audience's needs by identifying a clear position and fully supporting or refuting that position with relevant information. Text is uniformly organized, and language choices often enhance the text.

1 Sometimes addresses audience's needs by identifying a somewhat clear position and partially supporting or refuting that position with relevant information. Text is generally organized, and language choices seldom, if ever, enhance the text.

0 Rarely or never addresses audience's needs by failing to identify a clear position or failing to adequately support or refute a position that has been identified. Text lacks organization, and language choices seldom, if ever, enhance the text.

Bar Graph

2

- All information is accurately included.
- Graph is titled
- Axes are labeled.
- An appropriate scale is used.
- There is space between each bar.
- The graph is neat, well organized, and attractive.

1

- At least 4 of the above criteria have been met.

0

- Less than 4 of the above criteria have been met.

Line Plot

- 2 • All information is accurately included.
 • Graph is titled
 • X - axis is labeled
 • An appropriate scale is used.
 • The graph is neat, well organized, and attractive.
- 1 • At least 3 of the above criteria have been met.
- 0 • Less than 3 of the above criteria have been met.

Student Generated

Directions : Students may work cooperatively to design a scoring tool for line plots (or bar graphs). Students must remember the key elements of a graph.

2 _____

1 _____

0 _____